OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **LONG POND, LEMPSTER** the program coordinators recommend the following actions. *These interpretations are based on a limited set of data. Sampling more than once per summer will allow us to accurately establish trends when analyzing the data.*

FIGURE INTERPRETATION

- Figure 1: These graphs illustrate concentrations of chlorophyll-a in the water column. Algae are microscopic plants that are a natural part of lake ecosystems. Algae contain chlorophyll-a, a pigment necessary for photosynthesis. A measure of chlorophyll-a can indicate the abundance of algae in a lake. The historical data (the bottom graph) show a *stable* in-lake chlorophyll-a trend. It is important to realize that chlorophyll readings can change daily and one sample per summer cannot accurately portray seasonal trends. Chlorophyll-a concentrations have remained well below the NH mean reference line for 10 years! There seems to be no signs of increasing lake productivity, and we hope to see this trend continue for many years. While algae are present in all lakes, an excess amount of any type is not welcomed. Concentrations can increase when there are external and internal sources of phosphorus, which is the nutrient algae depend upon for growth. It's important to continue the education process and keep residents aware of the sources of phosphorus and how it influences lake quality.

- Figure 2: Water clarity is measured by using a Secchi disk. Clarity, or transparency, can be influenced by such things as algae, sediments from erosion, and natural colors of the water. The graphs on this page show historical and current year data. The lower graph shows a *stabilizing* trend in lake transparency, although the data reflects that clarity has decreased since 1990. Transparency remains well above the NH mean. Transparency also changes during the summer months. If samples are collected during different months each year, it is difficult to make comparisons from year to year. The 2000 sampling season was considered to be wet and, therefore, average transparency readings are expected to be slightly lower than last year's readings. Higher amounts of rainfall usually cause more eroding of sediments into the lake and streams, thus decreasing clarity.

- Figure 3: These figures show the amounts of phosphorus in the epilimnion (the upper layer in the lake) and the hypolimnion (the lower layer); the inset graphs show current year data. Phosphorus is the limiting nutrient for plants and algae in New Hampshire waters. Too much phosphorus in a lake can lead to increases in plant growth over time. These graphs show a *stable* trend for in-lake phosphorus levels. Phosphorus concentrations in the epilimnion and hypolimnion have been fairly consistent in the past three years, and we would like to see this continue. Both layers had concentrations below the state median. One of the most important approaches to reducing phosphorus levels is educating the public. Humans introduce phosphorus to lakes by several means: fertilizing lawns, septic system failures, and detergents containing phosphates are just a few. Keeping the public aware of ways to reduce the input of phosphorus to lakes means less productivity in the lake. Contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

OTHER COMMENTS

- **Please note** at all stations sampled except for the hypolimnion (lower water layer) phosphorus levels were found to be less than 5 µg/L (Table 8). The NHDES Laboratory Services adopted a new method of analyzing total phosphorus this year and the lowest value that can be recorded is less than 5 µg/L. If this caused an increase in the average phosphorus for either of the layers we would like to remind the association that a reading of 5 µg/L is still considered low for New Hampshire's waters.

- Residents were concerned with the number of geese residing at the pond this year and whether they were causing *E. coli* problems. *E. coli* originates in the intestines of warm-blooded animals (including humans) and is an indicator of associated and potentially harmful pathogens. Bacteria concentrations were all very low at the sites tested (Table 12), however, samples were taken after the geese had left the pond. Please consult the Other Monitoring Parameters section of the report for the current standards for *E. coli* in surface waters. We recommend taking bacteria samples when the geese are present in the pond so biologists can accurately identify and resolve a problem if it exists. Please contact the VLAP coordinator if you would like to conduct future sampling to address the problem. In the meantime, do not make the geese feel welcome by feeding them, as it will only make the problem worse.

- North Inlet was flowing this year, and this is the first sample we have taken since 1997. Conductivity, turbidity, and phosphorus results have remained low for the Inlet (Table 6, 11, and 8, respectively). This would indicate that there have not been any changes in the last three years that are negatively affecting the Inlet. The pH of the Inlet

(Table 4) was unusually high this year, and could be the result of laboratory error. Please note any changes that might be occurring in the watershed, so that we can accurately interpret a change in data.

NOTES

- Monitor's Note: Residents are concerned with a geese problem and E. coli. Complaints of more algae growth over the years in the Outlet cove. Water seems a bit murkier in the past couple of weeks. More plant growth near outlet.

USEFUL RESOURCES

Comprehensive Shoreland Protection Act, RSA 483-B, WD-BB-35, NHDES Fact Sheet. (603) 271-3503 or www.state.nh.us

Water Sampling Protocol for E. coli Testing, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Bacteria in Surface Waters, WD-BB-14, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

In Our Backyard. 1994. Terrence Institute, 4 Herbert St., Alexandria, VA. 22305, or call (800) 726-4853.

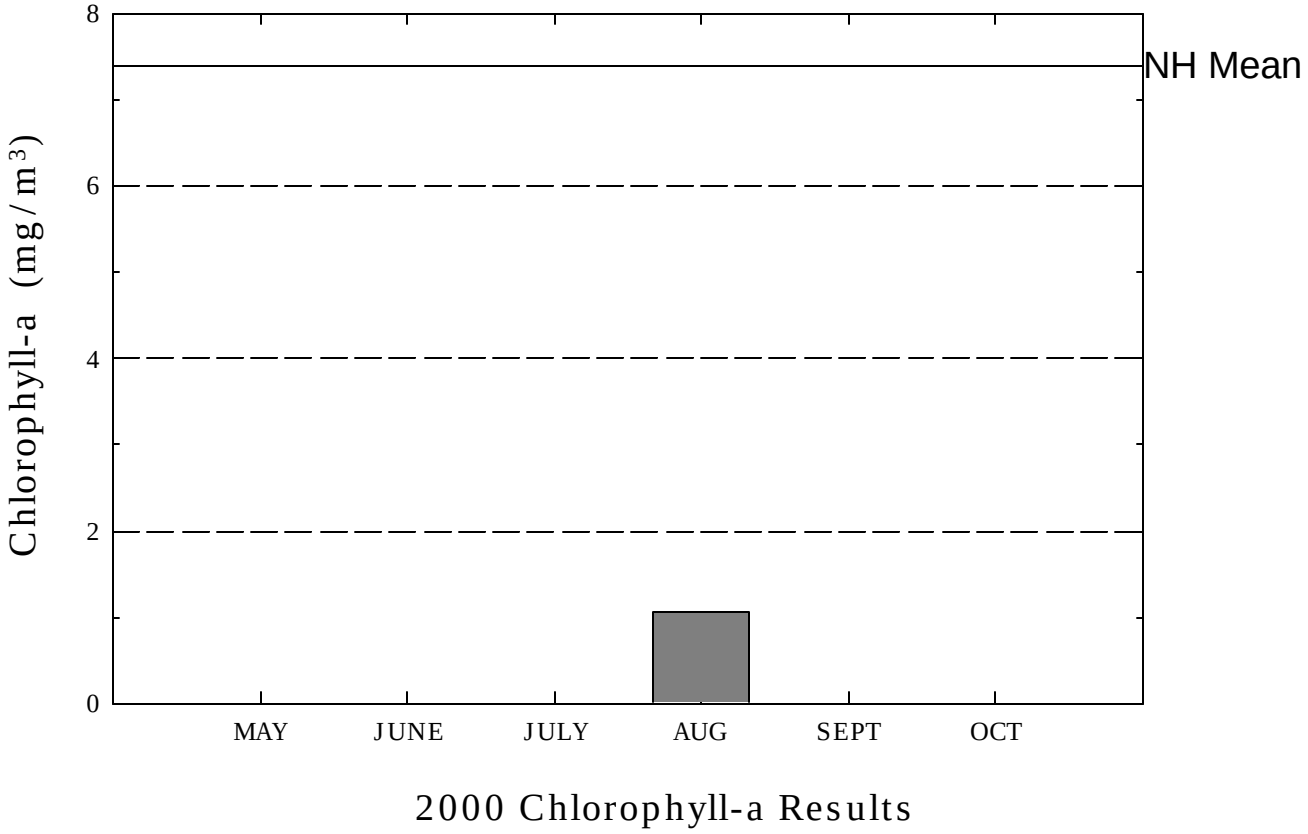
Clean Water in Your Watershed. Terrene Institute, 1993. (800) 726-5253, or www.terrene.org

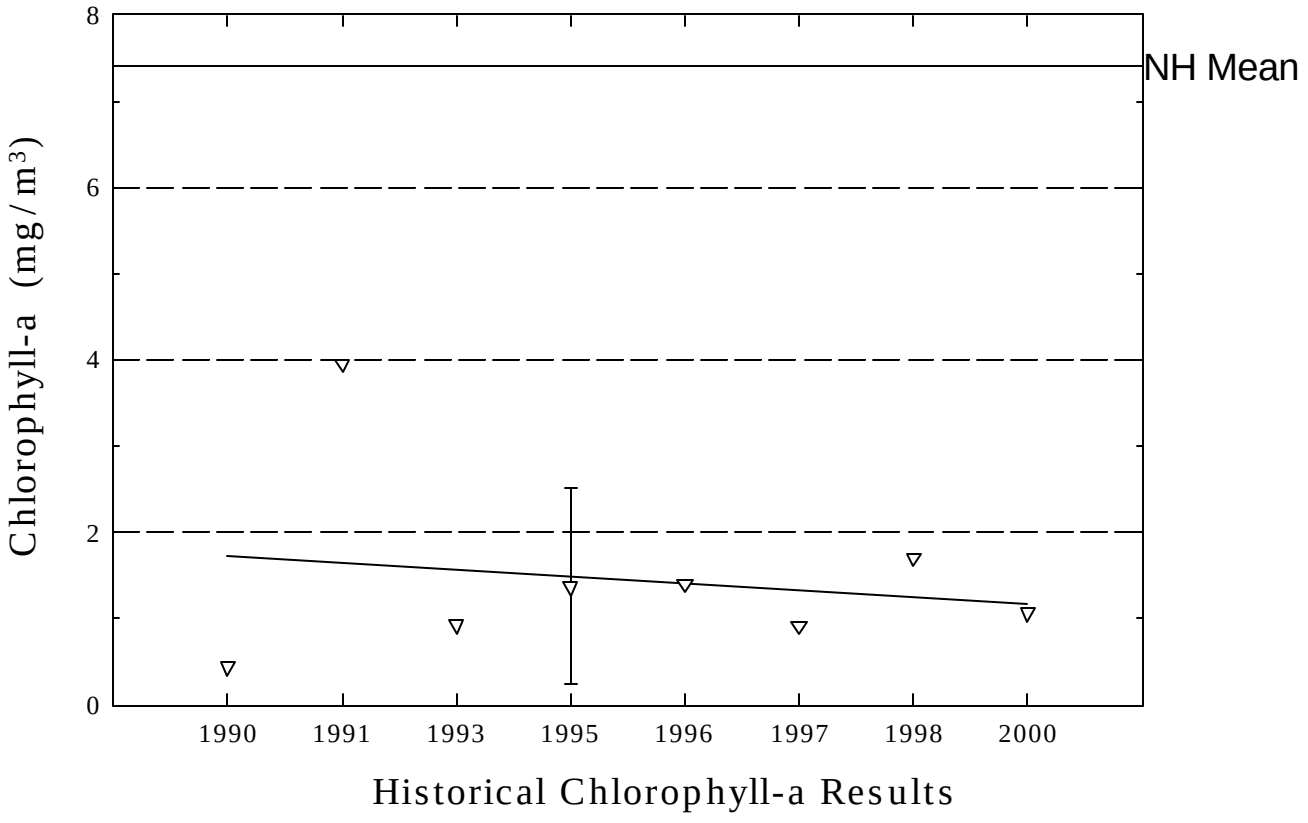
The Watershed Guide to Cleaner Rivers, Lakes, and Streams, Connecticut River Joint Commissions, 1995. (603) 826-4800

Aquatic Plants and Their Role in Lake Ecology, WD-BB-44, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Long Pond, Lempster

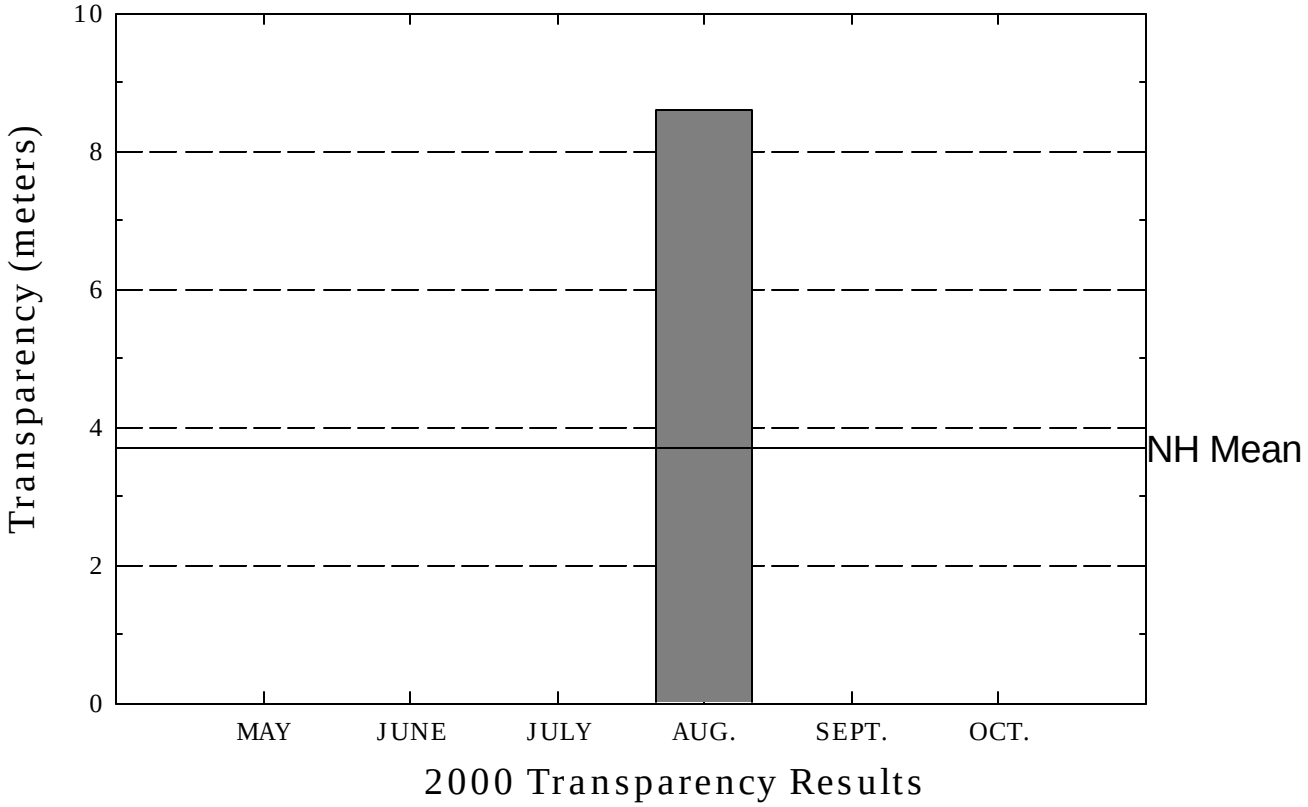
Figure 1. Monthly and Historical Chlorophyll-a Results

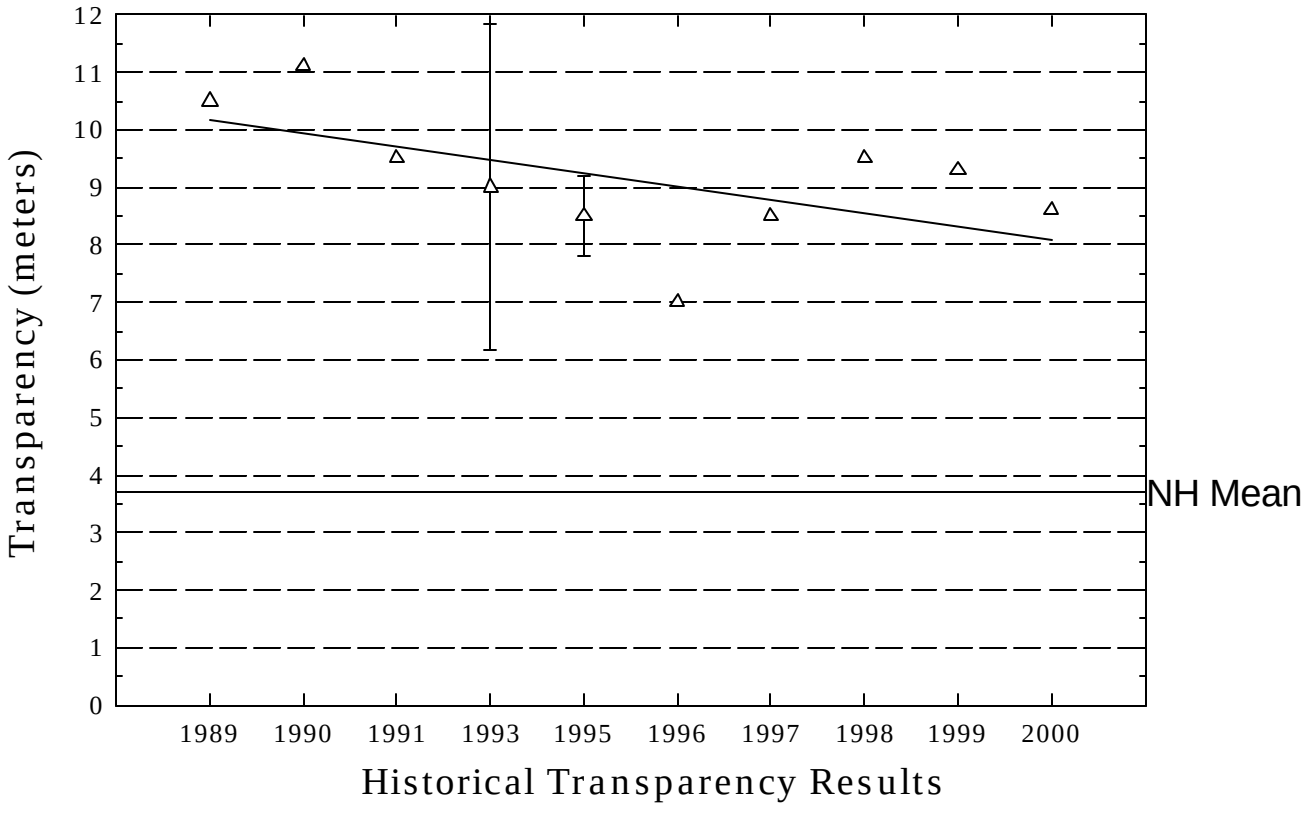




Long Pond, Lempster

Figure 2. Monthly and Historical Transparency Results





Long Pond, Lempster

Figure 3. Monthly and Historical Total Phosphorus Data.

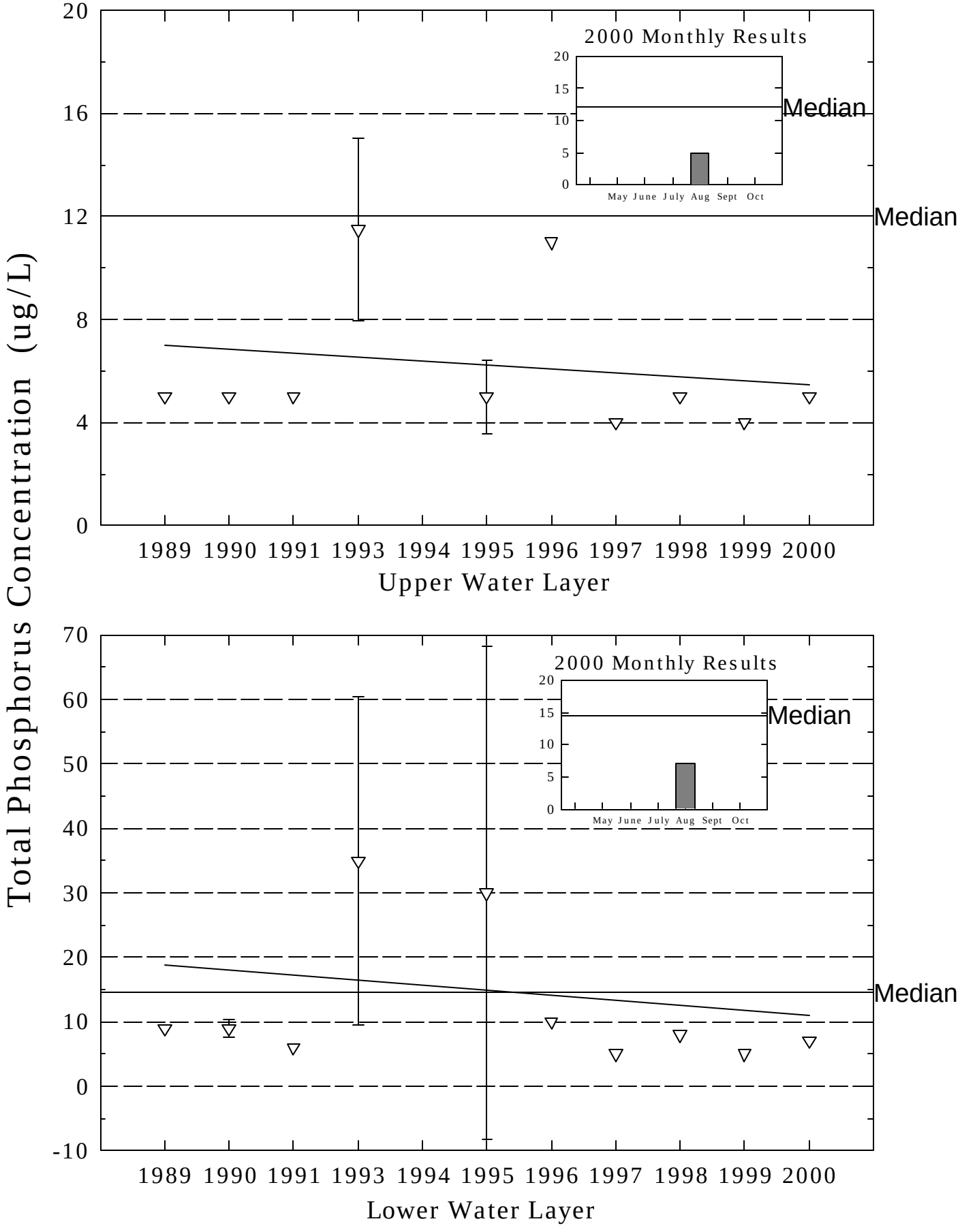


Table 1.

LONG POND

LEMPSTER

Chlorophyll-a results (mg/m^3) for current year and historical sampling periods.

Year	Minimum	Maximum	Mean
1990	0.44	0.44	0.44
1991	3.95	3.95	3.95
1993	0.93	0.93	0.93
1995	0.57	2.18	1.37
1996	1.40	1.40	1.40
1997	0.92	0.92	0.92
1998	1.71	1.71	1.71
2000	1.07	1.07	1.07

Table 2.

LONG POND

LEMPSTER

Phytoplankton species and relative percent abundance.

Summary for current and historical sampling seasons.

Date of Sample	Species Observed	Relative % Abundance
08 / 21 / 1989	DINOBRYON	68
	PERIDINIUM	
07 / 25 / 1990	DINOBRYON	70
	MOUGEOTIA	20
08 / 07 / 1996	DINOBRYON	57
	SYNEDRA	15
	CERATIUM	12
08 / 12 / 1997	RHIZOSOLENIA	30
	MELOSIRA	21
	DINOBRYON	12
08 / 06 / 1998	DINOBRYON	63
	SYNURA	32
	STEPHANODISCUS	3
08 / 06 / 1999	DINOBRYON	44
	CHRYSOSPHAERELLA	34
	MALLOMONAS	8
08 / 31 / 2000	PERIDINIUM	38
	DINOBRYON	14
	SYNURA	14

Table 3.

LONG POND

LEMPSTER

Summary of current and historical Secchi Disk transparency results (in meters).

Year	Minimum	Maximum	Mean
1989	10.5	10.5	10.5
1990	11.1	11.1	11.1
1991	9.5	9.5	9.5
1993	7.0	11.0	9.0
1995	8.0	9.0	8.5
1996	7.0	7.0	7.0
1997	8.5	8.5	8.5
1998	9.5	9.5	9.5
1999	9.3	9.3	9.3
2000	8.6	8.6	8.6

Table 4.

LONG POND

LEMPSTER

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
BACK COVE				
	1989	5.22	5.22	5.22
	1990	5.19	5.20	5.19
	1993	5.30	5.35	5.32
	1995	5.05	5.55	5.23
	2000	5.52	5.52	5.52
EPILIMNION				
	1989	5.30	5.30	5.30
	1990	5.20	5.21	5.20
	1991	5.50	5.50	5.50
	1993	5.25	7.05	5.54
	1995	5.26	5.37	5.31
	1996	5.20	5.20	5.20
	1997	5.39	5.39	5.39
	1998	5.34	5.34	5.34
	1999	5.88	5.88	5.88
	2000	5.93	5.93	5.93
HYPOLIMNION				
	1989	5.36	5.36	5.36
	1990	5.18	5.39	5.27
	1991	5.37	5.37	5.37
	1993	5.30	5.49	5.38
	1995	5.45	5.57	5.51
	1996	5.15	5.15	5.15
	1997	5.32	5.32	5.32
	1998	5.29	5.29	5.29

Table 4.

LONG POND

LEMPSTER

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
	1999	5.40	5.40	5.40
	2000	5.56	5.56	5.56
METALIMNION				
	1989	5.39	5.39	5.39
	1990	5.31	5.44	5.37
	1993	5.30	5.40	5.35
	1995	5.44	5.44	5.44
	1996	5.09	5.09	5.09
	1997	5.22	5.22	5.22
	1998	5.33	5.33	5.33
	1999	5.48	5.48	5.48
	2000	5.62	5.62	5.62
NORTH INLET				
	1989	5.27	5.27	5.27
	1990	5.15	5.18	5.16
	1991	5.22	5.22	5.22
	1993	4.25	5.34	4.52
	1995	5.31	5.45	5.37
	1996	5.26	5.26	5.26
	1997	5.36	5.36	5.36
	2000	7.24	7.24	7.24
OUTLET				
	1989	5.27	5.27	5.27
	1990	5.08	5.10	5.09
	1991	5.11	5.11	5.11
	1993	5.00	5.26	5.11

Table 4.

LONG POND

LEMPSTER

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
	1995	5.08	5.08	5.08
	1996	5.11	5.11	5.11
	1999	5.84	5.84	5.84
	2000	5.47	5.47	5.47

Table 5.

LONG POND

LEMPSTER

Summary of current and historical Acid Neutralizing Capacity.
Values expressed in mg/L as CaCO .

Epilimnetic Values

Year	Minimum	Maximum	Mean
1989	0.10	0.10	0.10
1990	-0.20	0.00	-0.10
1991	0.20	0.20	0.20
1993	-0.10	0.00	-0.05
1995	0.10	0.20	0.15
1996	0.10	0.10	0.10
1997	0.20	0.20	0.20
1998	0.10	0.10	0.10
1999	0.40	0.40	0.40
2000	0.40	0.40	0.40

Table 6.

LONG POND

LEMPSTER

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
BACK COVE				
	1989	21.5	21.5	21.5
	1990	20.7	21.0	20.8
	1993	20.5	22.2	21.3
	1995	21.1	22.3	21.7
	2000	18.9	18.9	18.9
EPILIMNION				
	1989	21.1	21.1	21.1
	1990	21.2	21.7	21.4
	1991	20.4	20.4	20.4
	1993	21.5	26.5	24.0
	1995	19.9	20.4	20.1
	1996	20.3	20.3	20.3
	1997	17.5	17.5	17.5
	1998	18.0	18.0	18.0
	1999	18.8	18.8	18.8
	2000	18.6	18.6	18.6
HYPOLIMNION				
	1989	21.8	21.8	21.8
	1990	21.3	21.6	21.4
	1991	19.3	19.3	19.3
	1993	19.8	21.1	20.4
	1995	19.9	20.0	19.9
	1996	22.1	22.1	22.1
	1997	17.2	17.2	17.2
	1998	19.1	19.1	19.1

Table 6.

LONG POND

LEMPSTER

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
	1999	19.1	19.1	19.1
	2000	19.3	19.3	19.3
METALIMNION				
	1989	20.9	20.9	20.9
	1990	20.6	20.8	20.7
	1993	19.7	20.8	20.2
	1995	21.4	21.4	21.4
	1996	21.5	21.5	21.5
	1997	16.8	16.8	16.8
	1998	18.0	18.0	18.0
	1999	18.5	18.5	18.5
	2000	18.6	18.6	18.6
NORTH INLET				
	1989	21.2	21.2	21.2
	1990	21.3	21.4	21.3
	1991	20.7	20.7	20.7
	1993	20.6	46.8	33.7
	1995	20.2	20.4	20.3
	1996	22.3	22.3	22.3
	1997	18.3	18.3	18.3
	2000	18.9	18.9	18.9
OUTLET				
	1989	21.2	21.2	21.2
	1990	21.0	21.7	21.3
	1991	21.2	21.2	21.2
	1993	20.6	22.1	21.3

Table 6.

LONG POND

LEMPSTER

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
	1995	20.5	20.7	20.6
	1996	20.5	20.5	20.5
	1999	19.0	19.0	19.0
	2000	18.8	18.8	18.8

Table 8.

LONG POND

LEMPSTER

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
BACK COVE				
	1989	4	4	4
	1990	6	12	9
	1993	9	21	15
	1995	7	9	8
	2000	< 5	5	5
EPILIMNION				
	1989	5	5	5
	1990	5	5	5
	1991	5	5	5
	1993	9	14	11
	1995	4	6	5
	1996	11	11	11
	1997	4	4	4
	1998	5	5	5
	1999	4	4	4
	2000	< 5	5	5
HYPOLIMNION				
	1989	9	9	9
	1990	8	10	9
	1991	6	6	6
	1993	17	53	35
	1995	3	57	30
	1996	10	10	10
	1997	5	5	5
	1998	8	8	8

Table 8.

LONG POND

LEMPSTER

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
	1999	5	5	5
	2000	7	7	7
METALIMNION				
	1989	5	5	5
	1990	5	14	9
	1993	2	22	12
	1995	18	18	18
	1996	13	13	13
	1997	6	6	6
	1998	8	8	8
	1999	1	1	1
	2000	< 5	5	5
NORTH INLET				
	1989	3	3	3
	1990	4	13	8
	1991	6	6	6
	1993	2	4	3
	1995	3	9	6
	1996	9	9	9
	1997	20	20	20
	2000	< 5	5	5
OUTLET				
	1989	5	5	5
	1990	7	7	7
	1991	10	10	10
	1993	4	4	4

Table 8.

LONG POND

LEMPSTER

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
	1995	7	7	7
	1996	8	8	8
	1999	10	10	10
	2000	< 5	5	5

Table 9.

LONG POND

LEMPSTER

Current year dissolved oxygen and temperature data.

Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
		August 31, 2000	
0.1	21.9	8.9	101.2
1.0	21.4	8.8	99.0
2.0	21.4	8.6	97.6
3.0	21.3	8.6	97.0
4.0	21.2	8.5	95.9
5.0	20.7	9.0	100.4
6.0	20.4	9.0	100.1
7.0	19.9	9.1	100.1
8.0	17.0	11.9	122.8
9.0	13.9	12.6	122.5
10.0	11.9	12.8	118.3
11.0	10.9	12.2	110.2
12.0	10.0	10.3	91.7

Table 10.

LONG POND

LEMPSTER

Historic Hypolimnetic dissolved oxygen and temperature data.

Date	Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
August 21, 1989	14.0	8.0	11.0	93.0
July 25, 1990	18.0	7.3	3.7	30.6
August 7, 1996	13.0	8.9	6.5	54.0
August 12, 1997	14.0	9.3	8.3	71.0
August 6, 1998	15.0	7.2	9.1	75.0
August 6, 1999	14.0	11.3	10.5	101.0
August 31, 2000	12.0	10.0	10.3	91.7

Table 11.

LONG POND
LEMPSTER

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
BACK COVE				
	1993	1.0	1.0	1.0
	1995	0.5	3.4	1.9
	2000	0.3	0.3	0.3
EPILIMNION				
	1993	1.9	1.9	1.9
	1995	0.3	0.5	0.4
	1997	0.1	0.1	0.1
	1998	0.1	0.1	0.1
	1999	0.1	0.1	0.1
	2000	0.1	0.1	0.1
HYPOLIMNION				
	1993	3.9	3.9	3.9
	1995	0.3	0.8	0.5
	1997	0.2	0.2	0.2
	1998	0.3	0.3	0.3
	1999	0.3	0.3	0.3
	2000	0.2	0.2	0.2
METALIMNION				
	1993	0.8	0.8	0.8
	1995	0.6	0.6	0.6
	1997	0.3	0.3	0.3
	1998	0.2	0.2	0.2
	1999	0.2	0.2	0.2
	2000	0.2	0.2	0.2
NORTH INLET				
	1993	0.7	0.7	0.7

Table 11.

LONG POND

LEMPSTER

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
	1995	0.3	0.6	0.4
	1997	0.7	0.7	0.7
	2000	0.1	0.1	0.1
OUTLET				
	1993	0.6	0.6	0.6
	1995	0.7	1.0	0.8
	1999	0.4	0.4	0.4
	2000	0.1	0.1	0.1

Table 12.

LONG POND

LEMPSTER

Summary of current year bacteria sampling.
Results in counts per 100ml.

Location	Date	E. Coli See Note Below
BEACH		
	August 31	1
OUTLET COVE		
	August 31	0

NOTE: "<" means "less than" and ">" means "greater than"